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Interactional challenges in conversations with autistic preadolescents: The role of prosody and non-verbal communication in other-initiated repairs



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Abstract

This paper focusses on repair sequences occurring in institutional interaction with autistic preadolescents. More precisely, the paper discusses the role of prosodic and non-verbal features in situations where the participants of interaction have difficulties understanding each other. The discussion will include analysis of the prosodic and non-verbal features of trouble-source turns that launch other-initiated repairs. Methodologically, the study falls within the framework of conversation analysis (CA). The data consist of audio-visual material recorded from group therapy sessions during which 11- to 13-year-old Finnish-speaking boys afflicted with autism talk about their lives with one another and with their therapists.

The study findings suggest that certain prosodic and non-verbal features are often associated with trouble-source turns. For example, in 84% of the cases here, there is no eye contact between the speaker producing a trouble-source turn and the one who initiates the repair sequence. Sometimes the lack of eye contact is associated with overlapping speech (38%). Concerning the prosody, the most frequent feature is a creaky voice, which occurs in 35% of the trouble-source turns. A quiet voice (31%), large pitch excursions (24%), stretched syllables (18%) and jerky speech rhythms (16%) are examples of other prosodic features that could be found in the trouble-source turns of the data.

The results of this study demonstrate that ASD persons' tendency to avoid direct eye contact as well as the occurrences of certain deviant prosodic features in their speech are factors that affect the fluidity of interaction and are related to the creation of understanding problems. However, only in a very few cases do non-verbal and prosodic features seem to be the main cause of the problem of understanding. The two most common causes of understanding problems in these data are overly literal interpretation of speech and topical discontinuities.

The study also gives new evidence about autistic persons' pragmatic and interactional skills. Indeed, the data include passages in which the informants seem to have the ability to make certain inferences about the mental states of others. This is remarkable, because it is known that the ability in question is impaired in autism.

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Keywords: Autism; Interaction; Prosody; Direction of gaze; Non-verbal communication; Repairs

1. Introduction

Autism spectrum disorder (ASD) is characterized by deficits in social communication and social interaction as well as by restricted repetitive behaviours, interests and activities (APA, 2013). The life of a person with ASD is often characterized by problems of understanding, including misunderstandings. This article discusses the role of prosodic and non-verbal features in situations in which the participants in the interaction have difficulties understanding one another.

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The discussion will include analysis of the prosodic and non-verbal features of the trouble-source turns that launch other-initiated repairs (Schegloff et al., 1977). Repair types and typical causes of the understanding problems materialized by the repairs will also be discussed. Methodologically, the study falls within the framework of CA (Sacks et al., 1974). Instrumental phonetics has also been used in observing the prosodic features.

The data consist of audiovisual material recorded from group therapy sessions during which 11- to 13-year-old Finnish-speaking boys afflicted with ASD talked about their lives with one another and with their therapists.¹ The data include two sessions with two different groups. One of these groups consists of four participants and two therapists, and the other one consists of three participants and two therapists. The data include 72 other-initiated repairs. Most of these (62) are repair initiations² and not outright corrections (10). Most repairs (84.7%) occur between the boys and the therapists. The remaining cases are between the boys (11.1%) or between the therapists (4.2%) (Lehtinen, 2012). The data will be described in more detail in Section 2.

CA constitutes an innovative and an efficient method for studying the understanding problems of children afflicted with ASD. Indeed, most previous studies that have treated the discourse practises of people afflicted with ASD have been carried out by experimental methods. In this study the interaction of autistic preadolescents is however approached from a CA perspective. That is, the data come from naturally occurring interaction, and not from an experimental setting that could easily render the interaction unnatural and therefore bias the results of the study. As the 'repair organization' of CA describes how parties in conversation deal with problems in speaking, hearing, or understanding, the method in question gives the perfect tools for the purposes of this study.

The repair abilities of children with ASD have been studied earlier from another methodological point of view by Volden (2004). The author examined the repair abilities of nine, high-functioning ASD children confronted with communication breakdown indicated by a stacked series of requests for clarification. The results showed that ASD children's repair abilities are in many respects similar to those of non-autistic children. The ASD children in Volden's (2004) study were able to respond to requests for clarification, and they used a variety of repair strategies. Like the non-autistic controls of the study, the ASD children were able to add more information when a breakdown persisted. However, they were also significantly more likely to use an inappropriate response when faced with a request for clarification than were the controls.

It has been shown that it is difficult for children with ASD to use the linguistic context to interpret a verbal message (Loukusa et al., 2007). These children also have difficulties in the pragmatic use of language, perspective-taking and shared understanding (Baron-Cohen, 1996; Baron-Cohen et al., 1999; Eales, 1993; Happé, 1994; Kleinman et al., 2001; Tager-Flusberg, 1993, 2001). Indeed, pragmatics of persons with ASD is an area which has attracted considerable clinical and research interest (Cummings, 2009, 2014a,b). It is often said that persons with ASD "fail to use language in either an appropriate or effective way in a range of communicative situations" (Cummings, 2009:56). For example, such persons have difficulties in the production and the comprehension of speech acts, in the use and understanding of non-literal language, in the ability to draw upon contextual information during language interpretation, as well as in different conversational skills (such as turn-taking) (Cummings, 2009:56, Cummings, 2014b:49). Ziatas et al. (2003) have found that autistic children use significantly lower proportions of assertions involving explanations and descriptions than typically developing children. Concerning mental assertions, children with ASD refer predominantly to desire and make few references to thought and belief.

The tendency of those with ASD to understand things literally and to miss implicit messages in interactions are well known (Cummings, 2009; Lehtinen, 2012; Lewis et al., 2008; Martin and McDonald, 2004; Nieminen-von Wendt et al., 2007a,b). According to Cummings (2009:57), this is probably related to the fact that in order to understand an utterance which is used to imply something beyond what is stated, a listener must be able to establish the communicative intention of the speaker. This, in turn, requires the ability to make certain inferences about the mental states of others (that is, to have a 'theory' of other 'minds'), an ability which is known to be impaired in autism.³ MacKay and Shaw (2004) report that children with ASD perform more poorly than controls without ASD on a test of understanding and identifying intentionality behind figurative utterances. According to Lewis et al. (2008), adults with ASD perform significantly less well than neurotypical (i.e. non-autistic) controls in pragmatic tests examining the comprehension of inferred meaning and the appreciation of humour. Emerich et al. (2003) found that autistic persons have difficulty with surprise and coherence aspects of humour. Problems of understanding humour amongst those with ASD are probably also a consequence of their general difficulty to make inferences about the mental states of others (Cummings, 2009; Martin and McDonald, 2004). In a study by Dennis et al. (2001), children with ASD failed to make inferences about what mental state verbs implied in context. They also failed to make inferences about social scripts, and they could not draw the inferences necessary for understanding metaphors and producing speech acts.

¹ The boys have been diagnosed with Asperger's Syndrome's. As Asperger's Syndrome has been eliminated from *DSM-5* (APA, 2013) as a distinct classification, I will refer to the condition of the informants as 'Autism Spectrum Disorder' (ASD), which nowadays encompasses Asperger's Syndrome.

² In a 'repair initiation' a repair sequence is started, but the outcome of the repair is left for the speaker who produced the trouble-source turn (Schegloff et al., 1977; Sorjonen, 1997).

³ Surian's (1996) study, for example, provides more evidence about the role of the 'theory of mind' deficits in the pragmatic difficulties of autistic children.

Discourse deficits have also been identified in children and adults with ASD (Cummings, 2014a,b). Asberg (2010) found that school-age children with ASD have significantly lower abilities in narrative discourse comprehension than younger typically developing children. ASD children also have difficulties in narrative co-telling (Solomon, 2004) and a tendency to respond in a non-contingent (i.e. off-topic) manner in conversation (Hale and Tager-Flusberg, 2005a). However, when Hale and Tager-Flusberg (2005b) studied ASD children's use of topic-related contingent utterances, they found that in the course of one year, these children made significant progress in the ability to maintain a topic of discourse. Losh and Capps (2003) report that children with ASD have impairments in inferring and building causal relationships within and across story episodes in narrative contexts. Capps et al. (1998) have shown that in conversations, autistic children less often offer new, relevant contributions than developmentally delayed controls. The ASD children in the study also produced fewer narratives of personal experience, and they failed more often than the controls to respond to questions and comments.

However, in many respects ASD children's discourse practices are similar to those of their neurotypical peers (Ochs and Solomon, 2004:139; Wiklund, 2012). For example, Kremer-Sadlik's (2001,2004) findings demonstrate that children with ASD are able to participate in question–answer adjacency pair sequences in relative competent ways. In my own previous study (Wiklund, 2012) I found that ASD persons are able to interpret correctly the implicit conversational meanings of combinations of dialogue particles, prosodic features and gestures. Children with ASD are also able to launch narratives in conversation (Solomon, 2001, 2004; Wiklund, 2012), while Sterponi's study (2004) shows that they notice social rule violations. Scalar inferences appear to be intact in individuals with ASD (Chevallier et al., 2010; Pijnacker et al., 2009), and Lewis et al. (2008) found no significant difference between adults with ASD and neurotypical adults on a test examining written and pictorial metaphors.

There is evidence of syntactic impairments in individuals with ASD (Cummings, 2014a). For example, it has been shown that children with ASD align their use of syntactic structure to that of a conversational partner (Allen et al., 2011). They also have a tendency to map verbs onto causative actions (Naigles et al., 2011). McGregor et al. (2012) report that only those children with ASD who do not have syntactic deficits demonstrate age-appropriate word knowledge. ASD children's word learning, in turn, has been found to be compromised on account of their reduced sensitivity to the social information of gaze cues (Norbury et al., 2010).

People with ASD often have atypical non-verbal behaviours, such as eye contact, facial expressions, postures and gestures (McPartland and Klin, 2006; Szatmari et al., 1989; Tantam et al., 1993; Wiklund, 2012). Indeed, the lack of eye contact is typically one of the first symptoms to draw adult attention to autistic children (Hutt and Ounsted, 1966; Kylliäinen, 2007). Typically, human infants develop the capacity to follow a gaze as early as three months of age (D'Entremont et al., 1997). This enables the possibility of establishing joint attention with another individual, and therefore helps in understanding others' thoughts and intentions (Baron-Cohen, 1996; Frith and Frith, 2001). People with ASD appear to have a different way of engaging in gaze following and an impairment of joint attention (Charman, 2004; Dawson et al., 2004; Loveland and Landry, 1986; Mundy, 1995; Mundy and Newell, 2007). Autistic individuals also have difficulties in recognizing non-verbal signs and the affective prosody of the interlocutor (Korpilahti et al., 2007; Kujala et al., 2005; Scott, 1985). In addition, ASD persons often have deviant prosodic features in their speech. For example, they may have a limited range of intonation, their speech can be overly fast, jerky or loud, or it can be characterized by large pitch excursions, a quiet voice, inconsistent pause structure, deviant word stress and/or a creaky or nasal voice (Baltaxe and Simmons, 1985, 1992; Fay and Schuler, 1980; Ghaziuddin and Gerstein, 1996; Lehtinen, 2010; Paul et al., 2005a,b; Shriberg et al., 2001; Provonost et al., 1966; Rutter and Lockyer, 1967; Ornitz and Ritvo, 1976; Tager-Flusberg, 1981; Paul, 1987; McPartland and Klin, 2006; Tager-Flusberg, 2000). Moreover, it has been shown that people afflicted with ASD have difficulty producing affective prosodic patterns (Scott, 1985).⁴ According to Peppé et al. (2007), children with ASD perform less well than typically developing children and typical adult controls on receptive and expressive prosody tasks. Fine et al. (1991) have, however, reported that ASD persons are able to employ useful prosodic patterns for communication. Producing appropriate stress patterns can nevertheless be difficult for them (Paul et al., 2005a,b). Shriberg et al. (2001) report that people with ASD have notable deficits in pragmatic and affective use of prosody, but they do not have difficulty with the grammatical functions of prosody. The same study shows that ASD people also have more disfluencies in their speech than neurotypical speakers.

This study focusses on the occurrences of the prosodic and non-verbal features in trouble-source turns that launch other-initiated repairs (repair initiations and outright corrections). Repair types and the usual causes that can be found behind the understanding problems materialized by the repairs will also be discussed. The study combines several aspects of interaction and endeavours to provide new information concerning the discourse practices of persons with ASD. Given that the role of prosodic and non-verbal features in the creation of understanding problems in interactions of those with ASD has not been studied before, the study provides new scientific information that can also have practical implications for families of children with ASD, as well as for therapists working with autistic persons.

The term 'prosody' is conceived here in a large sense, encompassing such paralinguistic features as breathiness, creak, nasalization and whisper (Couper-Kuhlen, 2000), in addition to dimensions of pitch (F0), intensity, speech rate and

⁴ On the other hand, Paul et al. (2005a) report that persons with ASD have no difficulty in the affective use of intonation.

pauses, which are more traditionally qualified as prosodic features. The analyses of the non-verbal communication will be focused on the direction of the gaze in producing trouble-source turns. Indeed, concerning the non-verbal communication, the direction of the gaze seems to be the most prominent and most frequent atypical feature in the data (Wiklund, 2012). Sometimes the lack of eye contact is associated with overlapping speech, which probably contributes to the creation of the repair sequence (Fujiki et al., 1990; Schegloff, 2000, 2001).

2. Data

The data consist of audiovisual recordings of neuropsychiatric group therapy sessions during which a group of approximately 12-year-old boys (Group A) and a group of approximately 13-year-old boys (Group B) talk with their therapists and with each other in Helsinki (Finland) in November 2009 (Group A) and February 2010 (Group B). Group A consisted of three participants and two therapists, and Group B consisted of four participants and two therapists. In both groups one therapist was male and the other female. The male therapist was the same in both sessions, while the female therapist changed. Most participants in these groups had been diagnosed with ASD,⁵ but both groups also included one member who had not been officially diagnosed with ASD at the time the data were recorded, although according to the therapists, both members exhibited the same kinds of symptoms as the others in the group.

The duration of each session was two hours. Two cameras were used to film these sessions. Each participant also had a microphone attached to his/her ear. The filming and the recording were executed by professionals in audio-visual technology. The sessions started by sharing news: each participant related what he had been doing recently, how things were going at school and so on. After hearing one participant's news, the others asked questions about what they had just heard.⁶ After this, the group discussed a predetermined theme with the help of a series of drawings. In both sessions filmed for this study, the theme was bullying at school. After approximately one hour, there was a 20-min break during which the participants and the therapists had a snack in another room. The break is not included in the data. The last part of the session consisted of playing games. In the sessions included in these data, the groups played a traditional Finnish board game called "The Star of Africa." The therapists did not participate in the game, because the idea of playing games in the sessions was for the boys to learn to do something together with their peers. The findings presented here do not concern this last part of the session, because non-verbal communication especially between the participants is obviously quite different when the situation involves talking only as opposed to interaction based on a common activity. Thus, the last part of the session should be studied separately from a somewhat different angle.

The next section will present different prosodic and non-verbal characteristics of the trouble-source turns occurring in the data. Different features will be illustrated with the help of an extract drawn from the session with Group B. Fig. 1 will illustrate the order in which the participants were sitting in this session. The names of the participants have, of course, been changed. 'FT' refers to 'female therapist' and 'MT' refers to 'male therapist'.

3. Prosodic and non-verbal characteristics of trouble-source turns

Trouble-source turns occurring in the data have typically certain prosodic and non-verbal features. The most important finding of this study is that in 84.1% of instances, there was no eye contact between the speaker producing a trouble-source turn and the one initiating the repair sequence (or making an outright correction). Sometimes the lack of eye contact is associated with overlapping speech (38.1%). Most often the overlaps occur between the boys and the therapists (62.5%). In the remaining cases, they occur between the therapists (20.8%) and the boys (16.7%). Sometimes there are other non-verbal features related to the trouble-source turn, but these are far less frequent than the lack of eye contact. For example, in a few instances, the speaker producing the trouble-source turn is smiling (4.8%), pointing at something with his finger (4.8%) or making gestures with his hands (4.8%).

Concerning the prosody, the most frequent feature is a creaky voice, which occurs in more than one-third (35.3%) of the trouble-source turns. A quiet voice is also relatively frequent; it is heard in nearly one-third of the instances (31.4%). Large pitch excursions (23.5%) occur in about one-quarter of the trouble-source turns. Stretched syllables (17.6%) and jerky speech rhythms (15.7%) appear in less than one-fifth of the cases. Other prosodic features that could be identified are bouncing pitch (11.8%), accelerated speech rate (11.8%), slowed speech rate (7.8%), loud speech (7.8%), large changes in volume (3.9%), sudden change of speech rate (3.9%), a nasal voice (3.9%), lack of pauses (1.9%) and a growling voice (1.9%).

The percentages indicating the frequencies of the above-mentioned features are presented in Table 1.

In the following sub-sections, an extract drawn from the data (Extract 1) will be discussed from different perspectives so that trouble-source turns and repair initiations will be analyzed side by side. More general discussion of the topic will also

⁵ As mentioned, the boys had been diagnosed with Asperger's Syndrome.

⁶ One of the characteristics of ASD is a lack of eagerness to share interests, joys and achievements with others or to show interest in other people's preoccupations (APA, 2013). Reciprocal social interaction in general is difficult for people with ASD.

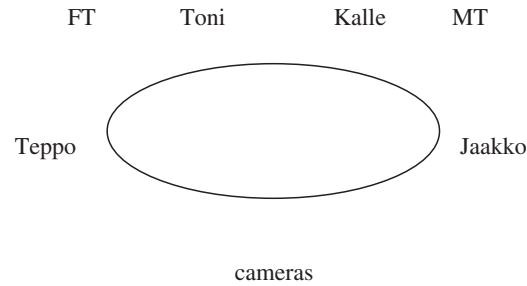


Fig. 1. Participants' sitting order around the table. Group B.

be included. Section 3.1 will focus on the repair types. Section 3.2 will treat the causes that can be identified behind the understanding problems materialized by the repairs. Finally, the non-verbal characteristics of the trouble-source turns will be discussed in Section 3.3 and the prosodic characteristics in Section 3.4.

3.1. Repair types

As mentioned, the data include 72 other-initiated repairs. Most of them (86.1%) are 'repair initiations' whereby a repair procedure is started by a participant, but the outcome of the repair is left for the speaker who produced the trouble-source turn. The remaining cases (13.9%) are 'outright corrections' in which the other participant not only indicates that something said earlier needs to be corrected, complemented or explained, but also presents another version (which he finds more correct or more complete) of the contents of the trouble-source turn (Schegloff et al., 1977; Sorjonen, 1997). Most of the repair sequences occur between the therapists and the boys (84.7%), but sometimes they also occur between the boys (11.1%) or even between the two therapists (4.2%). A large majority of the repair initiations are produced by one of the therapists (80.6%), whereas in half the cases the outright corrections are produced by one of the boys. The fact that most of the repair initiations are produced by one of the therapists and not by one of the boys might be related to the educational role of the therapists: that is, to the fact that the therapists are probably engaged in encouraging the participants to articulate things more clearly. Thus, in this data, all the repair sequences do not necessarily correspond clearly to a lack of understanding or hearing, but some of them may have an educational role.

Concerning the types of repair initiations, the data include both 'direct repair initiations' and 'candidate understandings', in other words, repair initiations in which the speaker not only indicates that there is a need for repair (as in 'direct repair initiations'), but also offers a possible solution, a candidate understanding, of the prior turn (Schegloff et al., 1977; Sorjonen, 1997). According to Leskelä (2012), candidate understandings constitute a frequently used device for resolving understanding problems between mentally disabled persons and their therapists. Kurhila (2012), in turn, has studied repair initiations in conversations between native and non-native Finnish speakers, and in her data as well, candidate understandings are much more frequent than direct repair initiations. For this reason it was interesting to find that in my data direct repair initiations are much more frequent (90.3%) than candidate understandings (9.7%), even if the type of data is similar to Leskelä's and Kurhila's in the sense that they all consist of "asymmetrical" interactions in which one party is linguistically more competent than the other. However, the fact that the therapists in my data mainly used direct repair initiations instead of candidate understandings is in line with the instructions of plain language designated for spoken communication with persons having lowered interaction skills (Kartio, 2009). According to these instructions, candidate understandings imply a risk of so-called "yea-saying". In other words, especially in asymmetrical conversations, there is a risk that the linguistically less competent speaker who has produced a trouble-source turn accepts a candidate understanding suggested by the more competent speaker even if its contents do not correspond to the intended meaning of the trouble-source turn (Kartio, 2009).

Extract (1) presents a situation including two trouble-source turns followed by other-initiated repairs.⁷ The extract has been drawn from the first part of the Group B session. At this moment Toni has just shared his latest news with the others. He has mentioned that school has been boring, and the female therapist reacts by saying that when she and the other therapist were kids, they thought that going to school was fun. The speaker's gaze is indicated at the top of each line in a notation system formulated by Goodwin (1981). A full stop (.) means that the speaker turns to look at an interlocutor. A line (—) is used to indicate that the speaker is looking at an interlocutor, and a comma (,) means that the speaker is turning his/her gaze away. In addition to these generally used conventions, a fourth sign has been added: a line of x's (xxxx) signifies that the speaker looks away from the interlocutors.

The first repair initiation in Extract (1) (line 07) is formulated by the female therapist with the help of the question word *mikä* ('what'): *mikä mikä oli* ('what what was'). This type of repair initiation targets a specific element of the trouble-source

⁷ The overall interaction can be found in the appendix.

Table 1
Frequencies of different prosodic and non-verbal features of trouble-source turns.

Non-verbal features	%	Prosodic features	%
No eye contact	84.1	Creaky voice	35.3
Eye contact	15.9	Quiet voice	31.4
Smile	4.8	Pitch excursions	23.5
Pointing gesture	4.8	Stretched syllables	17.6
Hand gestures	4.8	Jerky speech rhythm	15.7
		Bouncing pitch	11.8
		Accelerated speech	11.8
		Slowed speech	7.8
		Loud speech	7.8
		Changes in volume	3.9
		Change of speech rate	3.9
		Nasal voice	3.9
		Lack of pauses	1.9
		Growling voice	1.9

turn as problematic (Schegloff et al., 1977; Sorjonen, 1997; Drew, 1997). In this case, the question word *mikä* ('what') refers to *kouluruoka* ('food at school') occurring in the trouble-source turn produced by Kalle (line 04). Repair initiations formed with the help of question words constitute the most frequent type in my data: they represent 45.2% of all repair initiations. This percentage also includes candidate understandings. (If only direct repair initiations are taken into account, the corresponding percentage is 50.0%.)

Extract (1).⁸

xx

04 → Kalle: [no] (.) silloin oli varmaan kou#luruokakin parem°paa°#;
well at that time food was probably also better at school

xxxx

05 Toni: nii;
yeah

06 Jaakko: ((looks at Toni)) njää,
n-yeah

xxxxxxxxxxxxxxxxxxxx

07 → FT: ((bends towards Toni)) =mikä mikä oli,?
what what was

xxxxxxxxxxxxxxxx

08 Toni: <kouluruoka>
food at school
 xxx . ____

09 FT: (smack) [njaa-a] ((turns to look at Jaakko))
um I see

⁸ The conventions of transcription used in this paper correspond to those generally employed within CA (Jefferson, 2004).

3.2. Causes behind the understanding problems

According to [Drew \(1997\)](#), understanding in talk-in-interaction is mainly a sequential phenomenon that concerns units larger than a single turn. According to him, most understanding problems are not really caused by features occurring within one turn, but rather by the recipient's difficulties in seeing the relationship of the contents of a turn to what has been said before or its relevance to the topic being dealt with.⁹ Indeed, these 'topical discontinuities' ([Drew, 1997](#)) are very typical of my data as well.¹⁰ According to my studies, they constitute the second most frequent cause of understanding problems ([Lehtinen, 2012](#)). For example, in Extract 1, the first repair sequence is caused by a¹¹ topical discontinuity (lines 07–09):

XX

¹¹ The Finnish clitic particle *-han* typically implies that what is being said belongs to the common field of knowledge of the participants (ISK 2004: 797). It can also indicate astonishment (ISK 2004: 797). In this context both functions are possible.

04 → Kalle: [no] (.) silloin oli varmaan kou#luruokakin parem°paa°#;
well at that time food was probably also better at school
 xxxx
 05 Toni: nii;
yeah

06 Jaakko: ((looks at Toni)) njää,
n-yeah
 xxxxxxxxxxxxxxxxxxxx

07 → FT: ((bends towards Toni)) =mikä mikä oli,?
what what was
 xxxxxxxxxxxxxxxx

08 Toni: <kouluruoka>
food at school
 xxx . ____

09 FT: (smack) [njaa-a] ((turns to look at Jaakko))
um I see

The problematic element, *kouluruoka* ('food at school'), in Kalle's turn (line 04) is relevant to the topic being discussed, but it comes up suddenly, without any metalinguistic introduction or background information, which would be necessary for its interpretation. In other words, in order to be fully understandable, Kalle's turn requires background information on *how* the troublesome element (*kouluruoka*, 'food at school') is relevant to the topic; i.e. what exactly is its relationship to what has been said earlier in the conversation. However, it is noteworthy that the use of *kouluruoka* ('food at school') instead of only *ruoka* ('food') seems to display that Kalle understands that his comment about food has to be explicitly connected to the context of 'school' for his turn to make sense in the present context. It apparently fails for the female therapist but not for others: indeed, Toni first agrees with Kalle (line 05) and then provides the repair solution (line 08). The fact that Kalle understands that his turn has to be explicitly connected to the context of 'school' shows that he is able to make certain inferences about the mental states of others. This is remarkable, because as already mentioned, this ability is known to be impaired in autism (Cummings, 2009:57). The fact that the female therapist produces a repair initiation in this context might be related to her educational role: that is, even if she might understand what the boy wants to say, she probably wants to encourage him to articulate things more clearly. Thus, the repair may not indicate here a breakdown of intersubjectivity, but it may have an educational role.

The data also include instances in which the understanding problem is caused by verbal deficiencies occurring in the boys' speech. Their utterances can include, for example, morpho-syntactic mistakes or inconsistent pronominal references that make the interpretation of their speech more difficult. Nevertheless, while verbal deficiencies are highly characteristic of the informants' speech, they constitute the main cause of an understanding problem much more rarely than overly literal understanding of speech and topical discontinuities. This is probably because even if the turn includes major verbal problems, its contents can often be deduced from the context. There is, for instance, one passage in which the therapist asks the boys if they have any other questions. One of them, Jaakko, says, *mä voisin ainaki olla ittelleni yks hyvä kysymys*, which means 'I could at least be one good question to myself'. Even if this utterance seems incomprehensible in isolation, its interpretation is easy when considered in context. Indeed, the therapist smiles and answers immediately, *no mikä* ('well what is it'), which clearly indicates that he has understood that Jaakko would like to ask himself a question. The extract with the segment of interaction is given below (Extract 2).

23 Jaakko: <eli sil periaatteella (0.8) silloin ↑oli °parempaa°.>

so on that principle at that time it was better

24 (2.0)

xx

25 MT: mm

um

_____, xxxx

26 FT: ((looks at Jaakko))(smack) jaaha

um I see

The speaker (Jaakko) has difficulties verbalizing what he wants to say: the trouble-source turn (lines 10–14) includes several morpho-syntactic problems, such as wrong cases, ambiguous pronominal references and disconnected syntactic structures. For example, the speaker twice uses the nominative case instead of the genitive case (line 10: *perusruoka* → *perusruoan*; line 12: *kouluruoka* → *kouluruoan*). In the first utterance (lines 10–11) there is also an ambiguous pronominal reference *sil* ('that', line 10). It is not clear what this pronoun refers to, but it is possible that the speaker is using, in a way, the adessive form of the demonstrative pronoun *se* (*sillä* shortened *sil*) to replace the genitive case ending of the word *perusruoka* ('basic food', line 10). The structure of the second utterance, starting with the word *kouluruoka* ('food at school', line 11), is remarkably disfluent. It includes false starts (*hy-*, *hy-* and *oliv-*, lines 12–13) and pauses. In the beginning there is also a tense problem: the speaker uses the present tense (*ei tartte olla*, 'doesn't need to be', line 12) instead of the past tense. This is, however, corrected by the speaker a bit later (*ei tarttenu olla*, 'didn't need to be', line 13), which makes the utterance much more comprehensible. Finally, the main cause of the understanding problem is the ambiguous pronominal reference *ne* ('them', line 14) at the end of the second utterance. As mentioned above (cf. Section 3.1), the repair initiation of the therapist (line 16) clearly targets this element as troublesome: the therapist repeats the expression *samaa luokkaa kuin* ('on the same level as') used by Jaakko just before the "problem element" of the turn, the demonstrative pronoun *ne* (line 14).

It is noteworthy that Jaakko is able to respond here adequately to the therapist's implicit request for clarification. This is in line with Volden's (2004) results. Indeed (lines 17–21), Jaakko gives a rather long clarification of his previous turn. However, this turn is also remarkably disfluent. All the utterances of the turn are grammatically incoherent. The turn also includes false starts (*al-*, line 17; *hy-* and *pa-*, line 19), and there is a tense problem (line 20): the speaker uses again the present tense (*ja kouluruoka on parempaa joten ne on samal linjalla*, 'and the food at school is better so they are on the same level'), instead of the past tense.

Despite these problems, the therapist seems to understand what the boy wants to say: the female therapist nods and produces a discourse particle 'hmm-m' with a rising pitch (line 22). This means that the recipient is listening and that he is expecting the speaker to continue (ISK, 2004: § 798). Indeed, Jaakko interprets correctly the interactional meaning of the discourse particle, and continues speaking (line 23). In this turn Jaakko adds more information in order to clarify his point of view. This interactional strategy is successful, because both therapists produce a discourse particle that indicates that they have understood what Jaakko has tried to say (lines 25–26). Thus, even if the boy's speech includes a lot of morpho-syntactic problems, he is able to resolve the understanding problem with his own action.

It is also noteworthy that, in this passage, Jaakko is himself orientated to the difficulty in comprehension he expects of his recipients. Indeed, at the end of his turn (line 14), he says *jos joku just tajus mitä mä sanoin* ('if someone just understood what I said'). This is an interesting moment in which an autistic child appears to show an understanding of other people's perspectives. In other words, this passage demonstrates that the speaker in question has the ability to make certain inferences about the mental states of others (that is, to have a 'theory' of other 'minds'), even if this ability is known to be impaired in autism (Cummings, 2009:57).

3.3. Non-verbal characteristics of the trouble-source turns

In my previous studies I have noted that it is more difficult for preadolescents with ASD to maintain eye contact when they are speaking than when they are listening to others (Wiklund, 2012). In the present study the most important finding is probably that in 84.1% of the trouble-source turns in the data there was no eye contact between the speaker producing the

Jaakko also gestures with his hands. The gestures, however, seem haphazard and they do not help in interpreting his speech. The speaker probably gestures in order to help his concentration and/or to indicate uncertainty. Ambiguous hand gestures are associated with 4.8% of the trouble-source turns in the data. Other non-verbal features in the material include smiling (4.8%) and pointing at something with a finger (4.8%).

3.4. Prosodic characteristics of the trouble-source turns

The trouble-source turns of Extract (1) also have several prosodic features typical of the data. One of these is a creaky voice, which occurs in 35.3% of the material's trouble-source turns. In the turn produced by Kalle (line 04), a creaky voice is heard on the last four syllables of the “problem element”, *kouluruokakin* (‘food at school also’¹²), and with the last word of the turn, *parempaa* (‘better’). As the creak makes the speech a bit unclear, and as Kalle’s articulation generally speaking is not very clear, the creak may play a secondary role in the creation of the repair sequence.

Extract (1).

xx

04 → Kalle: [no] (.) silloin oli varmaan kou#luruokakin parempaa°#;

well at that time food was probably also better at school

A quiet voice can also be found in Kalle’s turn (line 04), but it is heard only on the last syllable of the word *parempaa* (‘better’). To measure the volume of speech, a relative intensity scale has been used consisting of three levels: L1 (the lowest intensity level in the speaker’s range), L2 (the mean intensity level) and L3 (the highest intensity level).¹³ A ‘quiet voice’ refers to speech that has been produced at a speaker’s L1 and ‘loud speech’ to speech that has been produced at L3. As a quiet voice emerges only with the last syllable of the turn and is not carried by the “problem element” of the turn, it does not seem to be of primary importance in this case.

There is also a brief overlap at the beginning of the turn: the particle *no* (‘well’) in Kalle’s turn (line 04) overlaps with the male therapist’s laughter (line 03). As the overlap occurs at the beginning of the trouble-source turn and as it is followed by a micropause, it does not seem to play a crucial role in this case either. However, combined with the creaky voice and the speaker’s unclear articulation, the overlap at the beginning and the quiet voice at the end of the turn contribute to the recipient’s overall impression. Thus, these features may not be completely irrelevant.

The second trouble-source turn in Extract (1) is also complex from the prosodical point of view (lines 10–14).

Extract (1).

xx

10 → Jaakko: [#ää no] silloin# silloin perusruoka #sil

well er at that time at that time basic food at that

xx

11 tasolla oli alhasempi ku nykyään joten# (0.4) krh (0.4)

level was lower than nowadays so

xx

12 †kouluruoka ei tartte #°olla ni°# .hh (0.4) niin hy- (0.3) °hy-°

the food at school doesn’t need to be that that go- go-

xx

¹² *Kouluruoka* is a compound noun (*koulu*, ‘school’ + *ruoka*, ‘food’). At the end of this word, there is a clitic particle, *-kin*, the meaning of which corresponds here more or less to ‘also’; i.e. food at school is an example of things that were better back in the old days (ISK, 2004: 806–807).

¹³ Each speaker had a microphone attached to his ear, and the distance between the mouth of the speaker and the microphone remained constant.

communication, different types of other-initiated repairs as well as typical causes of the understanding problems turned up by the repairs have been briefly presented.

Most of the other-initiated repairs (86.1%) in the data are 'repair initiations' whereby a repair procedure is started by a participant, but the outcome of the repair is left to the speaker who produced the trouble-source turn. The remaining cases (13.9%) are 'outright corrections' (Schegloff et al., 1977; Sorjonen, 1997). Most of the repair sequences occur between the therapists and the boys (84.7%). A large majority of the repair initiations are produced by the therapists (80.6%), whereas in half the cases the outright corrections are produced by the boys. The fact that most of the repair initiations are produced by one of the therapists and not by one of the boys might be related to the educational role of the therapists: that is, to the fact that the therapists are probably engaged in encouraging the participants to articulate things more clearly. Thus, all the repairs occurring in this data may not indicate a breakdown of intersubjectivity, but some of them may have an educational role.

Concerning the types of the repair initiations, the data include both 'direct repair initiations' and 'candidate understandings'—that is, repair initiations in which the speaker not only indicates that there is a need for repair (as in 'direct repair initiations'), but also offers a possible solution, a candidate understanding, of the prior turn (Schegloff et al., 1977; Sorjonen, 1997). The direct repair initiations are much more frequent (90.3%) than the candidate understandings (9.7%) in the data, even if other studies have shown that candidate understandings are often used in "asymmetrical" interactions (Leskelä, 2012; Kurhila, 2012). However, the fact that the therapists mainly used direct repair initiations instead of candidate understandings is in line with the instructions of plain language designated for spoken communication (Kartio, 2009).

Half (50.0%) of the direct repair initiations in the data were formulated with the help of a question word. Another typical type (25.0%) consists of open class repair initiators, such as *mitä* ('what') and its variants *tä(h)* and *hä(h)* as well as *anteeks* ('sorry'), etc. (Drew, 1997; Haakana, 2011). Repair initiations in which the trouble-source turn is partially or completely repeated in the repair initiation represent 14.3% of the direct initiations. Sometimes the repetition is associated with a question word or with the interrogative clitic *-ko*. The most uncommon repair initiation type in the data consists of an explicit verbalization of the understanding problem (10.7%). This type is used only by the therapists, and other studies have shown that it is rare also in other data gathered from asymmetrical institutional situations (Kurhila, 2012; Lindholm, 2012).

Probably the most important finding in this study is that in 84.1% of the cases, there was no eye contact between the speaker producing a trouble-source turn and the one initiating the repair sequence (or making an outright correction). This finding is not surprising in the sense that it is well known that people with ASD avoid direct eye contact (Szatmari et al., 1989; Tantam et al., 1993; Nieminen-von Wendt, 2004; Gillberg and Gillberg, 1989; Wiklund, 2012), a fact that is probably related to over-responsivity to sensory stimuli and/or to the sensory integration problems that characterize autism (Smith Myles et al., 2000; Nieminen-von Wendt et al., 2007a,b). However, that lack of eye contact is also so often associated with the turns which cause understanding problems seems quite surprising. Indeed, this result demonstrates that ASD persons' tendency to avoid direct eye contact is a factor that affects the fluidity of interaction and is related to the creation of understanding problems. The interactional role of eye contact should therefore be emphasized even more than before in autistic persons' therapy and education.

As for prosody, the most common feature is a creaky voice, which occurs in more than one-third (35.3%) of the trouble-source turns. A quiet voice is also relatively frequent; it appeared in nearly one-third of the instances (31.4%). Large pitch excursions (23.5%) occurred in about one-quarter of the trouble-source turns. Stretched syllables (17.6%) and jerky speech rhythm (15.7%) appeared in less than one-fifth of the cases. Bouncing pitch (11.8%) and accelerated speech rate (11.8%) are examples of other prosodic features that could be found in the trouble-source turns. Previous studies had already shown that ASD persons' speech often includes deviant prosodic features (Baltaxe and Simmons, 1985, 1992; Fay and Schuler, 1980; Ghaziuddin and Gerstein, 1996; Lehtinen, 2010; Paul et al., 2005a,b; Shriberg et al., 2001; Provonost et al., 1966; Rutter and Lockyer, 1967; Ornitz and Ritvo, 1976; Tager-Flusberg, 1981; Paul, 1987; McPartland and Klin, 2006; Tager-Flusberg, 2000). The results of this study demonstrate that these features – especially a creaky or a quiet voice and large pitch excursions – are also related to the creation of understanding problems in autistic persons' interaction.

Even if the trouble-source turns are most often produced so that there is no eye contact between the participants, and even if these turns often have certain prosodic features (such as a creaky or quiet voice and/or large pitch excursions), in very few cases do non-verbal and prosodic features seem to be the main cause of the understanding problem (Lehtinen, 2012). The overly literal understanding of speech as well as topical discontinuities are the two most common causes of the understanding problems occurring in the data. This confirms the results of previous studies, which have demonstrated that persons afflicted with ASD often understand things literally and miss implicit messages in interaction (Cummings, 2009; Lehtinen, 2012; Lewis et al., 2008; Martin and McDonald, 2004; Nieminen-von Wendt et al., 2007a,b), and that they have a tendency to respond in a non-contingent (i.e. off-topic) manner in conversation (Hale and Tager-Flusberg, 2005a).

The study also gives new evidence about autistic persons' pragmatic and interactional skills. Indeed, it is noteworthy that the data include passages in which the informants seem to have the ability to make certain inferences about the mental states of others (i.e., to have a 'theory' of other 'minds'). This is remarkable, because it is known that the ability in question is impaired in autism (Cummings, 2009:57). For example, the data include instances in which the informants

show an understanding of other people's perspectives and/or in which they are able to orient to implicit meanings, such as the interactional meanings of discourse particles (see also Wiklund, 2012).

In this data, deficiencies of verbal expression (such as morpho-syntactic mistakes, ambiguous pronominal references and disconnected syntactic structures) as well as speech overlaps are also more current causes of understanding problems than the prosodic and/or non-verbal features of communication. Indeed, there is previous evidence of syntactic impairments in individuals with ASD (Cummings, 2014a). According to this study, these impairments not only exist, but they can also cause understanding problems in autistic persons' interaction.¹⁶

It is, however, noticeable that especially when several prosodic and non-verbal features accumulate in a single turn that may also include other problems, these features may contribute to the creation of the repair sequence. However, in most cases their role seems to be secondary, even when the lack of eye contact is associated with overlapping speech (38.1%).

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Appendix

Extract (1).

01 FT: ((looks at MT)) ja sithän me oltiin i- (.) kun olimme koululaisia ni
and then-CLI we were when we were schoolchildren

02 meidän mielestä koulu oli kivaa,
we thought that going to school was fun

03 MT: ((looks at FT)) niin (.) ainakin aina silloin tällöin. hehee[heh]
yes at least every now and then (laughs)

xx

04 → Kalle: [no] (.) silloin oli varmaan kou#luruokakin parem°paa°#;
well at that time food was probably also better at school

xxxx

05 Toni: nii;
yeah

¹⁶ See also Lehtinen (2012) and Wiklund (submitted).

n-year

XXXXXXXXXXXXXX

what what was

XXXXXXXXXXXX

food at school

XXX .

um I see

XX

well er at that time at that time basic food at that

XX

level was lower than nowadays so

[illegible]

the food at school doesn't need to be that that go- go-

XX

wa- didn't need to be so good because it is on the same

[illegible]

level as them if someone just understood what I said

XXXXXXXXXXXXXXXXXXXXXXXXXXXX.

on the same level as

XX

17 Jaakko: .mth #no kun al- (.) (>kun oltii a↑jas<) taakseppäin#

well when lo- back in the old days

xx

18 ruoka oli vähän <↑alhaisempaa>. (0.9)

food was a bit lower

xx

19 #silleen (0.5) mh silleen kuing (.) °hy- pa-° (0.3) <makusta> ?

I mean like like how go- ba- taste

xx

20 (0.3) ja >↑kouluruoka on< parempaa joten ne on samal ↑linjalla

and the food at school is better so they are on the same level

xx

21 (0.5) johtuen ↑ajastansa. (1.4)

due to their time

22 FT: ((looks at Jaakko and nods)) hmm-m?

uh um

xx

23 Jaakko: <eli sil periaatteella (0.8) silloin ↑oli °parempaa°.>

so on that principle at that time it was better

24 (2.0)

xx

25 MT: mm

um

_____, xxxx

26 FT: ((looks at Jaakko))(smack) jaaha

um I see

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